Space Weather Forecast

Issued on Tuesday 17 December 2024 at 01:30 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of G1/Minor Geomagnetic Storms on Day 1 (17 Dec). Increasing risk of Moderate and Strong flares in the coming days.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low, with a mid Common-class flare registered at 16/0732 UTC from a region beyond the western horizon. There are five sunspot regions on the Earth-facing disc. The largest group on the disc, located in the southwest, saw minor growth of its main lead and trailing spots, but the region was largely inactive. A previously active, smaller region in the northwest saw decay in its leading spots, whilst maintaining a mature trailing region. A region in the southwest was the most developmental on the disc with emergence of spots in all parts of the group. Despite this the region appears stable. The remaining regions on the disc were largely unchanged through the period.

No new Earth-directed Coronal Mass Ejections (CMEs) were in evidence in available imagery.

Solar Wind / Geomagnetic Activity: The solar wind speeds showed a general slowing from slightly elevated to slow-ambient as the connection to the fast wind from a coronal hole gradually declined. However, there is evidence to suggest that a minor CME arrived at Earth after 16/1800 UTC, with a minor enhancement in solar wind parameters. Speeds peaked at 440km/s at 16/0336 UTC, before falling to around 390km/s by the end of the period. The Interplanetary Magnetic Field (IMF), was initially moderate, before becoming predominantly weak from 16/0630 UTC. The important north-south component, oscillated between northward and southwards, but generally favoured a weakly southward direction. The net result of the above solar wind measures was for mainly Quiet to Unsettled geomagnetic activity, but with an Active (Kp4) interval from 16/2100-2400 UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate Solar activity is forecast with a chance of Moderate flares on Day 1 (17 Dec), increasing to become likely from Day 2 (18 Dec) onwards. There is a daily, albeit very slight chance of isolated Strong flares.

Solar Wind / Geomagnetic Activity: A rather slow Coronal Mass Ejection (CME) that left the Sun on 15 Dec is expected to give Earth a glancing impact on either Day 2 or 3 (18 or 19 Dec). Several

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other CMEs that left the Sun in the past few days are forecast as near misses, but cannot be completely ruled out as flanking arrivals at Earth before the end of Day 3 (19 Dec). Otherwise a declining connection to the fast wind from a coronal hole is expected to see solar wind speeds ease to persistently background levels on Day 1 (17 Dec). No further coronal hole enhancements are anticipated through the remainder of the forecast period.

Geomagnetic activity is expected to be mainly generally Unsettled on Day 1 (17 Dec), but with Active intervals likely and a chance of G1/Minor Storm conditions, especially at first, due to coronal hole and/or CME influence. Between Days 2 and 3 (18-19 Dec) activity is likely to peak at Unsettled to Active levels following the forecast arrival of a glancing CME, with a slight chance of G1/Minor Storms occurring. Activity should return to Quiet to Unsettled levels by Day 4 (20 Dec).

Energetic Particles / Solar Radiation: There is a daily, slight chance of S1/Minor solar radiation storms or greater, in response to any notable solar flares.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	20	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	No	50	55	60	60
Very Active	R3-R5 (X Class)	No	5	5	10	10

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	15	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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